



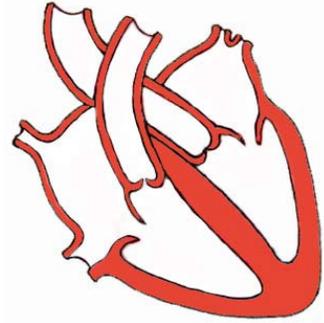
# *X-Plain*<sup>TM</sup>

## *Heart Valve Replacement*

### **Reference Summary**

Sometimes people have serious problems with their heart valves. A heart valve replacement surgery replaces a defective heart valve.

If your doctor recommends a heart valve replacement, the decision whether or not to have the procedure is also yours. This reference summary will review the benefits and risks of this surgery.



### **Anatomy**

The heart is the most essential muscle in the body. Its main function is to pump the blood to the lungs and the rest of the body. Two main compartments that look alike, the right heart and the left heart, form the heart. Each compartment has two chambers: a smaller chamber called an atrium and a bigger chamber called a ventricle. The ventricles are the main pumps of the heart.

Blood comes from the body to the heart through two big veins. This blood enters the right atrium. It is then pumped into the right ventricle through a valve known as the “tricuspid valve.” It is called tricuspid because it has three flaps, or cusps, and “tri” means three.

The blood is then pumped into the lungs through the “pulmonary valve.” In the lungs, the blood is loaded with oxygen. It then returns to the left side of the heart, to the left atrium.

Next, the blood is pumped into the left ventricle through the “mitral valve.” The left ventricle pumps the blood to the rest of the body through the “aortic valve.”

The valves have two functions:

- To allow the blood to flow through the heart smoothly.
- More importantly, to prevent the blood from leaking back against the main flow, the way the valve in a bicycle pump allows air to flow through in only one direction.

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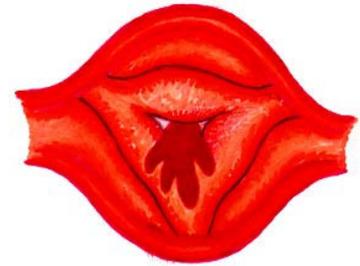
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## Symptoms And Their Causes

Valves are very delicate structures that can be damaged for a variety of reasons:

- Inflammation of the valves, as seen in diseases such as rheumatic heart disease.
- Infections of the valves, as seen in bacterial endocarditis.
- Chronic, or continual long-term wear and tear that leads to calcification and stiffness of the valves.
- Defects from birth, also known as congenital malformations.

These diseases can lead to 2 possible problems. One problem can be that the damaged valve may have a smaller opening than the original valve. This is known as “stenosis.” With stenosis, the heart has to work much harder at pushing the blood through. Over time this can cause strain on the heart and could even lead to death.



The other possible problem can be that the heart valve may allow blood to flow backward. This is called “insufficiency.” With insufficiency, the heart is less efficient at pumping blood to the body. This results in an increased workload, which can cause the heart to fail over time.

## Alternative Treatments

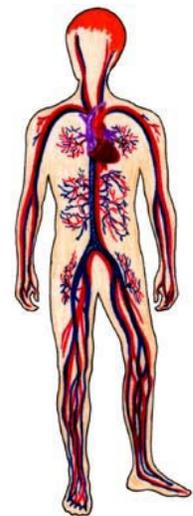
Medications can be used to help strengthen the heart and delay the need for an operation.

Exercise and losing weight, under your doctor’s supervision, may help strengthen your heart. Quitting smoking is essential to protect the heart. Valve replacement surgery is done when the damage starts to significantly affect the ability of the heart to function.

## Procedure

Before the operation, you should visit your dentist to check for any infections.

The valve can be replaced with either a mechanical valve or with a tissue valve. The disadvantage of a mechanical valve is that the patients have to be on blood thinners for the rest of their lives. Even though blood thinners are relatively safe, they do increase the risk of bleeding in the body. If this bleeding occurs in the brain, for example, it could lead to death.



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The advantage of a mechanical valve is that it will usually last a lifetime. However, in extremely rare circumstances the valve can malfunction and may need to be replaced.

An advantage of using tissue valves taken from animals or human cadavers is that blood thinners are not required. The disadvantage, however, is that they may get worn out over time and may need to be replaced every 10 to 15 years.

Make sure to discuss with your surgeon and cardiologist the difference between the two types of valves.

This operation is performed under general anesthesia, meaning that you will be asleep during the operation. The surgeon opens your chest in the middle. The breastbone is also opened in the middle so that the surgeon can reach the heart.

Special tubes are placed in the biggest veins and arteries of the body, close to the heart. The blood is then rerouted from the heart to a heart-lung bypass machine, a special machine that pumps blood through the body and loads it with oxygen. This machine takes over the job of the heart and lungs while the heart is being worked on.

The heart is then chemically stopped to allow the surgeon to operate on it. While the heart is stopped, the blood is continually circulated through the body and loaded with oxygen by the bypass machine.

The damaged valve is then removed and the new valve stitched into place. When the replacement is completed, the surgeon restarts the heart, and the blood is allowed to go back through the heart again.

Pacing wires are placed on the surface of the heart. In rare cases, these can be used to help restart the heart or to control its rate. These wires are brought out through the skin and hooked to a machine called a pacer. This is usually temporary and the wires are pulled out a few days later.

Once the heart is restarted, the breastbone is then stitched back together, and the chest incision is closed.

## **Risks And Complications**

This surgery is very safe. There are, however, some possible risks and complications that are unlikely but possible. You need to know about them just in case they happen. By being informed, you may be able to help your doctor detect complications early.

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The risks and complications include those related to anesthesia and those related to any type of surgery. Risks related to anesthesia and to rerouting the blood to the bypass machine during the surgery include, but are not limited to: arrhythmia, or abnormal heartbeats; pneumonia; kidney failure; blood clots in the legs; strokes; and death. These risks will be discussed with you in greater detail by your anesthesiologist or nurse anesthetist.

Blood clots in the legs can occur. These usually show up a few days after surgery. They cause the leg to swell and hurt a lot. These blood clots can get dislodged from the legs and go to the lungs, where they will cause shortness of breath, chest pain, and possibly even death. Sometimes the shortness of breath can happen without warning. It is therefore extremely important to let your doctors know if any of these symptoms occurs. Getting out of bed shortly after surgery may help decrease the risks of this complication.



Some of the risks are seen in any type of surgery. These include:

- Infection, deep or at the skin level. Infections can include the chest incision. Deep infections may involve the heart itself or the breastbone. Treating deep infections may require long-term antibiotics and possibly surgery to replace the valve.
- Bleeding, either during or after the operation. This may require a blood transfusion.
- Skin scars.

Other risks and complications are related specifically to this surgery. These, again, are very rare. However, it is important to know about them.

Rarely, the replaced valve may malfunction during, shortly after, or a long time after the operation. This may require urgent surgery to replace the defective valve. Death may occur in rare cases. Abnormal heartbeats, called arrhythmia, may occur after surgery. These can be controlled by medications and are usually temporary. Rarely, this can be permanent, requiring medications for life.

In some instances, a pacemaker might need to be placed. Persistent pain from the breastbone cut is unlikely but possible. The catheters placed in the various blood vessels can, in rare cases, injure the vessels.

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## After The Surgery

When the operation is done, you are transferred to the Intensive Care Unit, or ICU, usually still asleep and on the respirator.

While on the respirator, you will be unable to speak. You are kept comfortable with special sedatives.

During the following day, you are allowed to wake up and you are eventually taken off the respirator. When you are stable and off of the respirator, you will be transferred to a regular hospital room to continue the recovery. As you begin to move around in bed, your incisions will feel painful and sore with a sensation of pulling along the incision. These feelings may increase when you turn or cough.

Your nose and throat will be sore from having the breathing and stomach tubes in. Lozenges and spray can help ease this discomfort.

The soft, rubber tube that was inserted into your bladder during surgery is called a Foley catheter. This may cause a feeling of pressure in your bladder or the need to urinate. One to two days after surgery, this tube is removed; you may feel burning the first few times you urinate afterwards.

As you begin to take a more active role in your recovery, you will notice that your surgical incisions are sore and that there may be itching or numbness along them. You may also see bruising or slight redness around the area. This is the normal healing process and will disappear with time.

When looking at your chest incision, you will see two small wires; these are called pacing wires. They are placed on each side of your incision, just below your rib cage. These wires may be attached to a pacemaker to regulate your heart if needed.

You will not be able to feel the wires attached to your heart; however, you may feel the tape that is used to secure the wires to the skin. These wires will be removed before you leave the hospital.

Your wrist may be bruised and sore. This is because of a blood pressure monitoring catheter that was placed there during surgery. This too will improve in a few days. Your muscles will feel sore and weak for some time after the surgery; this will improve.

You will follow a cardiac rehabilitation program to allow a gradual transition back to usual daily activities.

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To decrease the chance of damage to the new valve, you should:

- avoid smoking
- eat healthy
- lose excess weight.
- exercise regularly, initially under your doctor's supervision.

You should tell your dentist and other doctors that you have a prosthetic valve. You should also take antibiotics before and after any dental work or other invasive procedure to prevent possible infections.

If you leave the hospital on blood thinners such as Coumadin™, you will be asked to have frequent blood tests to check on how thin your blood is. The doctor usually checks two numbers; the prothrombin time, or PT, and the INR number. These have to stay in a specific range.

The dosage of Coumadin™ may have to be changed frequently until the right dosage is reached. Once the right dosage is reached, you will still have to check your blood-thinning level on a regular basis, usually monthly. Food rich in Vitamin K could decrease the effectiveness of Coumadin™.

One of the main risks of blood thinners like Coumadin™ is life-threatening bleeding. Even after very minor accidents, you may have to be checked by a physician for signs of bleeding that could lead to death.

Check with your doctor if you develop a severe headache. Headaches could result from bleeding in the brain. Report to your doctor any unusual bleeding or any blood in your stools or urine. Very dark and black stools may mean that you are bleeding in the intestines or stomach. Make sure to let your doctor know about all of these, and anything that is unusual or worrisome.

Be sure to wear a medical alert bracelet stating that you are on blood thinners. Inform any new doctor or healthcare provider that you are on blood thinners. Some tests are dangerous when you are on this type of medication. Blood thinners may have to be stopped prior to these tests.

If taken by a pregnant woman, this type of medication could result in birth defects. Many medications, including over-the-counter medications such as aspirin, can affect your blood thinners and possibly lead to very serious bleeding consequences. ALWAYS ask your doctor before taking any new medication.

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## Summary

Healthy heart valves are important for good blood circulation and for maintaining a healthy heart. Healthy valves keep the blood flowing and prevent blood from backing up.

Unfortunately, sometimes valves can be damaged, not allowing enough blood to flow through them or allowing blood to leak back against the flow. If this happens, you may need heart valve replacement surgery to replace a valve with either a mechanical valve or a tissue valve.

Make sure to contact your doctor in case of any new symptoms, such as chest pain, shortness of breath, weakness, swelling, infection, or fever. Call your doctor if you feel that your heart is beating too quickly, too slowly, or skipping beats.

Valve replacement surgery is relatively safe. Risks and complications are rare, but possible. Knowing about them will help you detect them early if they happen.

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